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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/656,613

09/04/2003

Joseph H. Johnson

05-022con/Tank-190con

7994

7590

11/17/2004

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EXAMINER

QUINTO, KEVIN V

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/656,613

Applicant(s)

JOHNSON ET AL.

Examiner

Kevin Quinto

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 20, 34-36, 38 and 40 is/are rejected.
- 7) ☒ Claim(s) 2-19, 21-33, 37, 39 and 41-50 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4 September 2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 13, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Ogura (USPN 6,211,041 B1).
3. In reference to claim 1, Ogura (USPN 6,211,041 B1) discloses a similar structure. Figures 1F and 2F of Ogura each illustrate a silicon carbide based (column 7, lines 20-23 and column 11, lines 63-65) silicon structure with a silicon carbide substrate (2). There is a bonding layer (3) overlying the silicon carbide substrate (2). There is a single crystal silicon semiconductor material (5) having a top surface. The single crystal silicon semiconductor material (5) overlies the bonding layer (3). The single crystal silicon semiconductor material (5) is bonded to the silicon carbide substrate (2) via the bonding layer (3).
4. With regard to claim 13, the bonding layer (3) is silicon dioxide.
5. In reference to claim 20, Ogura (USPN 6,211,041 B1) discloses a similar structure. Figures 1F and 2F of Ogura each illustrate a silicon carbide based

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(column 7, lines 20-23 and column 11, lines 63-65) silicon structure with a silicon carbide substrate (2). There is a single crystal silicon semiconductor material (5) having a top surface. The single crystal silicon semiconductor material (5) is on the silicon carbide substrate (2) via a bonding layer (3). The examiner notes that the applicant has stated that the single crystal silicon semiconductor material is grown on the silicon carbide substrate. However this places claim 20 into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hira*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 20 does not distinguish over the Ogura reference regardless of the process used to form the single crystal silicon semiconductor material, because only the final product is relevant, and not the process of making such as growing the single crystal silicon semiconductor material on the silicon carbide substrate.

6. Claims 34-36, 38, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by D'Anna et al. (USPN 6,251,923 B1).

7. In reference to claim 34, D'Anna et al. (USPN 6,251,923 B1, hereinafter referred to as the "D'Anna" reference) discloses a similar structure. Figure 7 of D'Anna discloses a silicon carbide based structure with a double bonding layer (162, 164) over a silicon carbide substrate (126). There is a single crystal silicon semiconductor material (128) overlying the double bonding layer (162, 164). The

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single crystal silicon semiconductor material (128) is bonded to the silicon carbide substrate (126) via the double bonding layer (162, 164).

8. With regard to claims 35, 38, and 40, the silicon carbide substrate (126) is of a p-type conductivity type with a first dopant concentration. The single crystal silicon semiconductor material (128) is of a p-type conductivity type with a second dopant concentration.

9. In reference to claim 36, the first dopant concentration of the silicon carbide substrate (126) is greater than the second dopant concentration of the single crystal silicon semiconductor material (128).

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 34-36, 38, and 40 are rejected under the judicially created doctrine of double patenting over claims 53 and 64 of U. S. Patent No. 6,521,923 B1

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since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: a silicon carbide substrate that is bonded to a single crystal silicon semiconductor material via a double bonding layer such that the dopant concentration of the silicon carbide substrate is greater than that of the single crystal silicon semiconductor material.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

Allowable Subject Matter

12. Claims 2-19, 21-33, 37, 39, and 41-50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior which suggests bonding a silicon carbide substrate with a single crystal silicon semiconductor material such that the silicon carbide substrate and the single crystal silicon semiconductor material may have a plurality of layers with different conductivity types.

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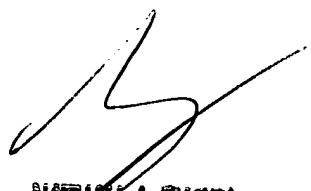
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KVQ



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